

Appl. No. 10/708,502
Amdt. dated April 21, 2005
Reply to Office action of January 25, 2005

REMARKS/ARGUMENTS

1. Rejection of claims 1, 3, 6, 15, 17, 20, 28, 30, 33, and 36-38 under 35 U.S.C. 102(b):

Claims 1, 3, 6, 15, 17, 20, 28, 30, 33 and 36-38 are rejected under 35 U.S.C. 102(b)
5 as being anticipated by Nagahara (US 2002/0192945, dated 12/19/02).

Response:

Please refer to claim 1 of the present application as follow:

10 Claim 1: A method of forming at least one wire on a substrate, the substrate comprising
at least one conductive region, an insulating layer disposed on the substrate, the method
comprising:
forming a hard mask layer on a surface of the insulating layer;
forming at least one recess by removing portions of the hard mask layer and portions
15 of the insulating layer;
forming a light blocking layer on a surface of the hard mask layer and the recess, the
light blocking layer and the hard mask layer forming a composite layer;
forming a gap filling layer on a surface of the light blocking layer, and the gap filling
layer filling up the recess;
20 forming a photoresist layer on a surface of the gap filling layer;
aligning a photo mask with the recess by utilizing the composite layer as a mask;
and
performing an exposure and development process to form at least one pattern above
the recess in the photoresist layer.

25

Claim 1 of the present application discloses that **the photo mask is aligned with the recess by utilizing the composite layer as a mask**. The recess is a new alignment mark used to align the photo mask, and it is distinct from an old alignment mark used to align another photo mask for forming the recess. Furthermore, the composite layer is utilized as

Appl. No. 10/708,502
Amdt. dated April 21, 2005
Reply to Office action of January 25, 2005

a mask to prevent alignment light beams from reaching the old alignment mark. Therefore, the present application is capable of achieving two direct alignments to improve alignment accuracy.

- 5 Nagahara never teaches or suggests how to align a photo mask to form the pattern above the recess and fails to provide a method of utilizing two direct alignments for forming dual damascene structures.

- 10 In light of these differences, claim 1 is not anticipated by Nagahara. As claims 3 and 6 are dependent upon claim 1, they should be allowable if claim 1 is allowed. Reconsideration of claims 1, 3, and 6 is therefore politely requested.

Please refer to claims 15 and 28 of the present application as follow:

- 15 Claim 15: A method of forming at least one wire on a substrate, the substrate comprising at least one first conductive region and at least one second conductive region, an insulating layer disposed on the substrate, the method comprising:
- forming a hard mask layer on a surface of the insulating layer;
 - forming at least one first recess above the first conductive region and at least one
 - 20 second recess aside the second conductive region by removing portions of the hard mask layer and portions of the insulating layer;
 - forming a light blocking layer on a surface of the hard mask layer, the first recess, and the second recess, the light blocking layer and the hard mask layer forming a composite layer;
 - 25 forming a gap filling layer on a surface of the light blocking layer, and the gap filling layer filling up the first recess and the second recess;
 - forming a photoresist layer on a surface of the gap filling layer;
 - aligning a photo mask with the second recess by utilizing the composite layer as a mask; and

Appl. No. 10/708,502
Amdt. dated April 21, 2005
Reply to Office action of January 25, 2005

performing an exposure and development process to form at least one pattern above the first recess in the photoresist layer.

5 Claim 28: A method of forming at least one wire on a substrate, the substrate comprising at least one first conductive region and at least one second conductive region, an insulating layer disposed on the substrate, the method comprising:

forming at least one first recess above the first conductive region and at least one second recess aside the second conductive region by removing portions of the insulating layer;

10 forming a bottom anti-reflective coating (BARC) on a surface of the insulating layer, the first recess, and the second recess, and the bottom anti-reflective coating filling up the first recess;

forming a photoresist layer on a surface of the bottom anti-reflective coating, and the photoresist layer filling up the second recess;

15 **aligning a photo mask with the second recess by utilizing the bottom anti-reflective coating as a mask; and**

performing an exposure and development process to form at least one pattern above the first recess in the photoresist layer.

20 Claims 15 and 28 of the present application disclose that **the photo mask is aligned with the second recess by utilizing the composite layer and the bottom anti-reflective coating as a mask respectively.** The second recess is a new alignment mark used to align the photo mask, and it is distinct from an old alignment mark used to align another photo mask for forming the first recess and the second recess. Furthermore, the composite layer
25 and the bottom anti-reflective coating are utilized as a mask to prevent alignment light beams from reaching the old alignment mark. Therefore, the present application is capable of achieving two direct alignments to improve alignment accuracy.

Nagahara never teaches or suggests how to align a photo mask to form the pattern

Appl. No. 10/708,502
Amdt. dated April 21, 2005
Reply to Office action of January 25, 2005

above the first recess and fails to provide a method of utilizing two direct alignments for forming dual damascene structures.

In light of these differences, claims 15 and 28 are not anticipated by Nagahara. As
5 claims 17, 20, 30, 33, and 36-38 are dependent upon claims 15 and 28, they should be allowable if claims 15 and 28 are allowed. Reconsideration of claims 15, 17, 20, 28, 30, 33, and 36-38 is therefore politely requested.

2. Rejection of claims 1 and 3 under 35 U.S.C. 102(b):

10 Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Harada et al. (US 6,251,774, dated 6/26/01).

Response:

15 In claim 1, the present application emphasizes that a **photo mask is aligned with the recess by utilizing the composite layer as a mask**. However, Harada never teaches or suggests how to align a photo mask to form the pattern above the recess and fails to provide a method of utilizing two direct alignments for forming dual damascene structures.

20 In light of these differences, claim 1 is not anticipated by Harada. As claim 3 is dependent upon claim 1, they should be allowable if claim 1 is allowed. Reconsideration of claims 1 and 3 is therefore politely requested.

3. Rejection of claims 1 and 15 under 35 U.S.C. 102(e):

25 Claims 1 and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Ma (US 2003/0216036, dated 11/20/03, filed 6/5/03).

Response:

In claims 1 and 15, the present application emphasizes that a **photo mask is aligned**

Appl. No. 10/708,502
Amdt. dated April 21, 2005
Reply to Office action of January 25, 2005

with the recess and the second recess respectively by utilizing the composite layer as a mask. However, Ma never teaches or suggests how to align a photo mask to form the pattern above the recess and the first recess respectively, and fails to provide a method of utilizing two direct alignments for forming dual damascene structures.

5

Thus, the applicant submits that claims 1 and 15 are patentably distinguishable from Ma. Reconsideration of the rejections over claims 1 and 15 is hereby requested.

4. Rejection of claims 1 and 15 under 35 U.S.C. 102(e):

10 Claims 1 and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Chang (US 2003/0166345, dated 9/4/03, filed 3/2/02).

Response:

15 In claims 1 and 15, the present application emphasizes that a photo mask is aligned with the recess and the second recess respectively by utilizing the composite layer as a mask. However, Chang never teaches or suggests how to align a photo mask to form the pattern above the recess and the first recess respectively, and fails to provide a method of utilizing two direct alignments for forming dual damascene structures.

20 Thus, the applicant submits that claims 1 and 15 are patentably distinguishable from Chang. Reconsideration of the rejections over claims 1 and 15 is hereby requested.

4. Rejection of claims 2, 4-5, 7-14, 16, 18-19, 21-27, 29, 31-32, 34-35 and 39 under 35 U.S.C. 103(a):

25 Claims 2, 4-5, 7-14, 16, 18-19, 21-27, 29, 31-32, 34-35 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagahara (US 2002/0192945, dated 12/19/02).

Response:

Claims 2, 4-5, 7-14, 16, 18-19, 21-27, 29, 31-32, 34-35 and 39 are dependent on

Appl. No. 10/708,502
Amdt. dated April 21, 2005
Reply to Office action of January 25, 2005

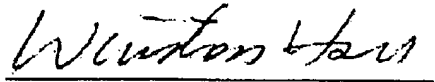
claims 1, 15 and 28, and should be allowed if claims 1, 15 and 28 are allowed.
Reconsideration of the rejection of claims 2, 4-5, 7-14, 16, 18-19, 21-27, 29, 31-32, 34-35
and 39 is therefore respectfully requested.

5

Applicant respectfully requests that a timely Notice of Allowance be issued in this
case.

10

Respectfully submitted,



Date: April 21, 2005

Winston Hsu, Patent Agent No. 41,526

15 P.O. BOX 506, Merrifield, VA 22116, U.S.A.

Voice Mail: 302-729-1562

Facsimile: 806-498-6673

e-mail : winstonhsu@naipo.com

20 Note: Please leave a message in my voice mail if you need to talk to me. The time in D.C.
is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan).